

Organic Solvents- Safe Work Practices

Organic solvents are routinely used for a variety of applications throughout the University. These chemicals contain carbon in their molecular structure and are capable of dissolving or dispersing other substances. Due to their ability to dissolve oils, fats, resins, rubber and plastics, organic solvents are used in many commercial products including paints, varnishes, lacquers, adhesives, dyes, textiles, pharmaceuticals, glues and degreasing/cleaning agents.

There are many different classes of organic solvents including chlorinated hydrocarbons, aliphatic hydrocarbons, aromatic hydrocarbons, alcohols, glycols, ethers, esters, ethers, ketones and many others. The hazardous properties of organic solvents are determined by their molecular structures. Many organic solvents are toxic (e.g. carbon tetrachloride) while others are highly flammable (e.g. ethanol). Some organic solvents are recognized as carcinogenic (e.g., benzene, trichloroethylene) while others are confirmed reproductive hazards (e.g., 2-ethoxyethanol, methyl chloride) or neurotoxins (e.g., n-hexane, tetrachloroethylene, toluene).

The best way to determine the hazardous properties of the organic solvents being used in the lab is to read the **safety data sheets** (SDSs) provided by chemical manufacturers and distributors. The following table lists some common classes and examples of organic solvents found in laboratories. **This list is not comprehensive.**

Chlorinated Solvents	Aliphatic Hydrocarbons	Aromatic Hydrocarbons
Carbon tetrachloride	Cyclohexene	Benzene
Chloroform	Cyclohexane	Naphthalene
Methylene chloride	n-Hexane	Toluene
Tetrachloroethylene	n-Heptane	Xylenes
Trichloroethane	Pentane	
Trichloroethylene	Petroleum ether	
Alcohols/Glycols/Ethers	Esters/Ketones/Aldehydes	Others
Methanol	Ethyl acetate	Formaldehyde
Ethanol	Acetone	Glutaraldehyde
Propanol	Methyl ethyl ketone	Carbon disulfide
Butanol	Methyl isobutyl ketone	Pyridine
Ethylene glycol	Methyl n-butyl ketone	Amides
Diethyl ether		Amines

Safe Work Practices

Due to the hazards associated with many organic solvents, safe work practices should be followed by researchers to control hazards and minimize exposure:

- Read the **safety data sheet (SDS)** for each organic solvent prior to use.
- Eliminate, substitute less toxic chemicals or reduce the quantities of organic solvents being used if possible.
- Work with organic solvents in a chemical fume hood or under local exhaust ventilation.
- Wear personal protective equipment as indicated by safety data sheets or the lab's [workplace hazard assessment form](#).
- Store organic solvents away from incompatible materials.
- Do not allow flammable organic solvents near open flames or other sources of ignition.
- Separate halogenated and non-halogenated wastes if possible.
- Do not use solvents for routine cleaning tasks, where a less toxic substance would be adequate.

Chemical Incompatibilities

The following substances should not be added to hazardous waste containers with organic solvents:

- Acids or bases
- Aqueous solutions of toxic organic chemicals
- Toxic substances (e.g. Ag, As, Ba, Cd, Cr, Hg, Pb, Se)
- Vacuum pump oil
- Sulfides or inorganic cyanides
- Strong oxidizers or reducers
- Water-reactive substances
- Unknowns or other incompatible materials

Recycling

When large volumes of organic solvents are being used in laboratories, consideration should be given to methods of recycling such as distillation. The money saved in solvent purchase costs may exceed the upfront costs of investing in a distillation unit, as long as the distillation unit can recover the purity of solvent needed for the intended research.

Additional Resources

Centers for Disease Control and Prevention- Organic Solvents

<http://www.cdc.gov/niosh/topics/organsolv/>

Occupational Safety & Health Administration- Solvents

<http://www.osha.gov/SLTC/solvents/index.html>

Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards

<http://www.ehs.uconn.edu/Chemical/Prudent%20Practices%20in%20the%20Laboratory.pdf>